Reply to: 3460

November 6, 1990

Subject: Gypsy Moth Biological Evaluation - Allegheny National Forest

To: Forest Supervisor, Allegheny National Forest

Enclosed is the "Biological Evaluation of Gypsy Moth Populations, Allegheny National Forest, Pennsylvania, 1990". This report includes gypsy moth egg mass survey results and recommendations for treatment in 1991.

Gypsy moth populations are increasing throughout the Allegheny National Forest and it looks like suppression activities may be warranted for the spring of 1991.

Bob Acciavatti will be visiting the Allegheny National Forest on November 20, 1990, to meet with Bob White and possibly others to discuss the results and implications of this survey. If you have any questions concerning this survey or other pest problems, please give me a call. We appreciate your cooperation and assistance with our pest management activities and are looking forward to working with the Allegheny National Forest staff in the coming year.

KELLY S. RIDDLE

Forestry Technician

Forest Pest Management

#### Enclosure

cc: AO

District Ranger, Bradford RD

District Ranger, Marienville RD

District Ranger, Ridgway RD

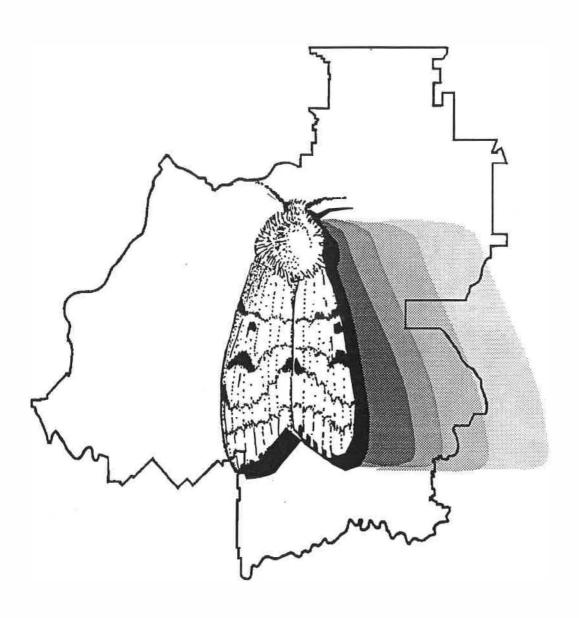
District Ranger, Sheffield RD

L. Yarger, R-9

B. Towers, PA DER-BOF

KSR/mae

# BIOLOGICAL EVALUATION OF GYPSY MOTH POPULATIONS, ALLEGHENY NATIONAL FOREST, PENNSYLVANIA 1990





Kelly Riddle
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November 1990



## BIOLOGICAL EVALUATION OF GYPSY MOTH POPULATIONS, ALLEGHENY NATIONAL FOREST, PENNSYLVANIA 1990

#### **SUMMARY**

Gypsy moth egg mass densities have again increased within most of the Allegheny National Forest (ANF). Several areas have population densities which approach, or exceed, minimum thresholds for spraying. Within individual Opportunity Areas (OAs), average egg mass densities ranged from 0 to 205 egg masses per acre. These averages for entire OAs are below minimum threshold levels; however, specific areas within several of the OAs have densities of 250-1140 egg masses per acre which meet, or exceed, minimum levels.

Areas of potentially defoliating populations should be considered for spraying during the spring of 1991 to prevent additional tree mortality, nuisance, and to maintain species diversity for wildlife.

#### INTRODUCTION AND BACKGROUND

1990 is the first year since 1984 that no gypsy moth defoliation existed on the Allegheny National Forest. During the six year outbreak period, just over 210,000 acres were defoliated by the gypsy moth. As a result of the defoliation, substantial oak tree mortality has occurred within the Sheffield, Bradford, and Marienville Ranger Districts. This mortality has triggered extensive salvage sale operations to recoup value losses. Also there is concern among land managers on the ANF as to the affects of the mortality on the way the oak forest type should be managed. Tree mortality has also forced FPM to alter the location and process in which the oak forest type is sampled to estimate gypsy moth populations.

Originally, only high value timber stands and developed recreation sites were considered when planning ANF suppression projects. Following the oak mortality of 1987, priorities for selecting spray blocks are now based on maintaining the overall tree species diversity throughout the Forest.

#### **OBJECTIVES**

The objectives of this biological evaluation were to accurately estimate gypsy moth population densities and, if necessary, to present recommendations for suppression.

#### **SURVEY PROCEDURES**

During this year's survey, both 1/40th acre and five-minute walk techniques were used to estimate egg mass densities. The five-minute walk survey was designed to estimate the general population throughout an OA, while the 1/40th acre plot survey was designed to estimate the population in specific highly susceptible stands. Map 1 of Appendix B presents the opportunity areas on the Allegheny National Forest.

The number of five-minute walks that were distributed throughout any given Opportunity Area depended upon the total acreage of susceptible forest type in that OA. At each survey point, all egg masses were counted along a compass bearing for five minutes, survey personnel then retraced their steps and counted egg masses back along the same line; the two counts were averaged to get a single value for that plot. The count for each plot was then used in the formula:

Y = 20.56X + 14.58 where Y = egg masses per acre X = average of egg mass counts

The per acre values for each plot were then averaged for the entire Opportunity Area. Average per acre values are presented for each of the Opportunity Areas in Table 1, Appendix A.

Stands identified as having >50 percent white or chestnut oak were classified as being highly susceptible and were surveyed using 1/40th acre plots. Forty-three stands were selected and a series of 6, 1/40th acre plots established at 2-4 chain intervals within each stand. A range pole with a target at 5 feet was placed at plot center; the survey then used a 10 BAF prism to sight on the target and establish an 18.6 foot radius plot boundary. An imaginary cylinder was extended from the ground through the canopy and all egg masses within this cylinder are tallied. An average of the plot counts was multiplied by 40 (blow-up factor for 1/40th acre plot) to determine the egg mass density per acre for the stand. Average per acre values for the susceptible stands are shown in Table 2, Appendix A.

Additional information taken at these sample plots included the approximate percentage of oak in the stand by percent cover to help interpret variations in egg mass counts. Also, the general size of the egg masses and the presence of parasites (*Ocencyrtus* wasps) on the egg masses were noted as an indication of gypsy moth population health and whether it is declining or increasing.

The linear relationship between egg mass density and defoliation of host type have been published by David Gansner, NEFES, Radnor, PA, and were used to predict the potential 1991 defoliation; greater than 750 egg masses per acre can be expected to cause moderate defoliation (30-60 percent) and greater than 1500 egg masses per acre can result in severe defoliation (60-100 percent). In past projects, densities of 250 and 500 egg masses per acre have been used as minimum thresholds for treatment within developed recreation sites and visual corridors respectively. The average and range of defoliation potential for each of the opportunity areas is shown in Table 3, Appendix A.

#### OBSERVATIONS AND CONCLUSIONS

Gypsy moth populations are increasing slightly throughout the Allegheny National Forest. Average per acre egg mass densities in the general OA survey ranged from 0 in R12L and R8H to 205 in M1L Although these egg mass densities are below threshold levels for each OA as a whole, isolated "hotspots" exist where egg mass densities meet, or exceed, minimum suppression thresholds. Within the highly susceptible stands that were surveyed, egg mass densities averaged 167 per acre and ranged from 0 to 1140. Stands of lower susceptibility (<50 percent white or chestnut oak) had densities which averaged 90 egg masses per acre and ranged from 0 to 173. Maps 2-14, Appendix B, show the individual OAs that include these localized high population areas.

Along with the increase in population, the size and condition of the gypsy moth population on the ANF has increased. The average size of the egg masses this year are large with 14 percent egg parasitism. Last year's survey showed that egg masses were of medium size and egg parasitism averaged 60 percent.

Due to the upward shift in gypsy moth population vigor and density, the localized "hotspots" that exist, and the past history of gypsy moth on the Allegheny National Forest, suppression activities should be considered for FY 91. In addition, yearly detection and evaluation monitoring needs to be continued to insure that potentially explosive populations are detected.

#### ALTERNATIVES AND POTENTIAL IMPACTS ON THE FOREST RESOURCE

Potentially damaging gypsy moth populations exist within 13 of the opportunity areas on the Forest and occur within stands managed for their tree species diversity, timber, and recreation. Basically, the ANF managers have two options:

- 1) no action
- 2) spray in selected areas to prevent nuisance, defoliation, and subsequent tree morality

If the no action alternative is chosen, the potential exists for nuisance and moderate defoliation in isolated areas across the ANF. Although research has shown that second outbreak episodes of gypsy moth result in reduced tree mortality rates, the Allegheny National Forest can ill afford additional oak mortality in previously defoliated stand. For this reason, consideration should be given to the suppression alternative. Forest resource values such as recreation, timber, and tree species diversity would be protected by suppressing building gypsy moth populations rather than waiting until a large scale outbreak develops.

## **APPENDIX A**

Table 1.-- 1990 Gypsy moth egg mass survey results, Allegheny National Forest.

OA	Average EM/A	Egg Mass Size	Approx. % Oak on Plots	% of Plots with Parasites	1990-91 Population Trend
B1M B2M B7L B3M B8H	127 53 44 80 31	Med/Large Large Med/Large Med/Large Med/Large	27 31 33 37 11	21 39 17 9 23	Increasing Increasing Increasing Increasing Increasing
M1L M10M M11M M12M M5M M4H M7H M3L	205 37 39 58 39 135 97	Large Large Large Med/Large Large Large Large	55 .3 7 29 29 26 0 40	15 0 6 9 0 9 0	Increasing Increasing Increasing Increasing Increasing Increasing Increasing
R11M R12L R8H M12M	24 0 0 64	Large  - Med/Large	0 0 0 19	33   19	Increasing Decreasing Decreasing Increasing
S8L S12L S4H S3H S16M S14M S15H	43 44 64 56 94 102 68	Medium Med/Large Med/Large Med/Large Medium Med/Large Medium	34 28 56 43 37 48 47	1 0 25 25 13 15 0	Increasing Increasing Decreasing Increasing Increasing Increasing Increasing

Table 2.-- 1990 Gypsy moth egg mass survey results, Allegheny National Forest.

OA	Comp/ Stand	EM/A	Egg Mass Size	% Oak	Parasites
B1M	C1-\$\frac{5}{5}49	667	Medium	70	Y
B2M	C47-\$5	200	Medium.	90	N
B2M	C1- <u>ई</u> 13	87	Medium	40	N
B2M	C1-\$22	27	Medium	20	N
ВЗМ	C18-\$19	40	Medium	75	N
M1L	C6-\$22	93	Large	65	N
M3L	C3- <b>5</b> 4	173	Medium	40	у
M3L	C17-\$1	60	Medium	70	N
M3L	C17-\$2	107	Medium	65	N
M3L	C13-\$30	220	Large	75	N
M3L	C13-\$25	80	Medium	60	N
M5M	C20-\$2	47	Medium	70	N
M12M	C67-\$23	107	Large	40	N
M12M	C90- <b>\$</b> 5	220	Large	95	N
M12M	C54-\$5	207	Large	80	N
M12M	C54-\$3	280	Large	80	N
M12M	C54-\$6	107	Large	30	N
M12M *	C105-\$55	613	Large	80	N
M12M *	C105-\$57	1140	Medium	75	Υ
M12M *	C105-\$47	393	Medium	70	Υ
S04H	C19-\$36	273	Small	90	N
S04H	C19-538	20	Medium	85	N
S04H	C18-\$23	0		60	-
S04H	C24-\$40	7	Medium	90	N
S04H	C24-\$42	20	Medium	90	Υ
S04H	C22-\$8	7	Medium	70	N
S04H	C4-518	0	-	70	-
S04H	C4- <b>\$</b> 15	20	Medium	75	N
S04H	C24-\$13	0	44	90	-
S04H	C24-\$17	47	Medium	75	N
S09H	C27-\$15	60	Medium	80	N
S09H	C27-\$19	180	Medium	80	N
S09H~	C27- <b>9</b> 5	40	Medium	65	N
S14M	C48- <b>\$</b> 5	120	Medium	80	N
S15H	C154-\$20	80	Medium	60	Υ
S15H	C151-\$19	47	Medium	60	N
S16M	C133- <b>\$</b> 2	207	Large	70	Υ
S16M	C81- <b>5</b> 22	133	Medium	40	Υ
S16M	C81-\$11	93	Medium	70	N
S16M	C83-\$1	87	Medium	70	N
S16M	C128-\$28	0		0	_

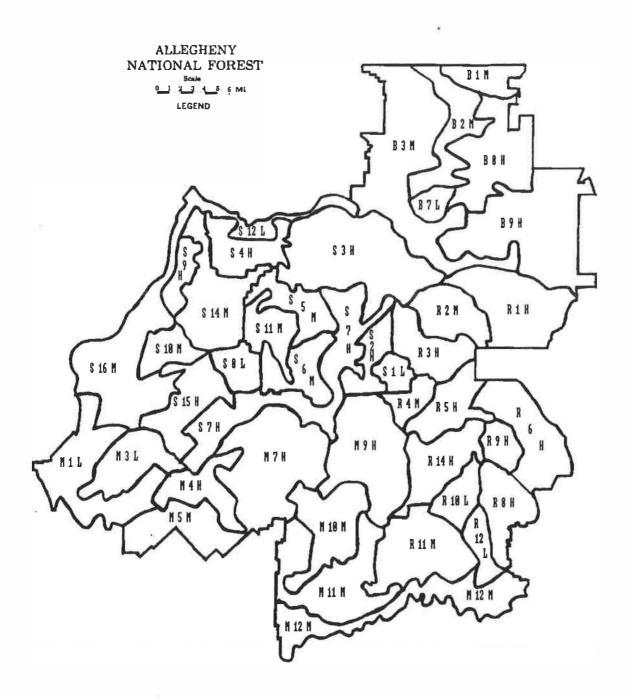
<sup>\*</sup> RIDGWAY RANGER DISTRICT

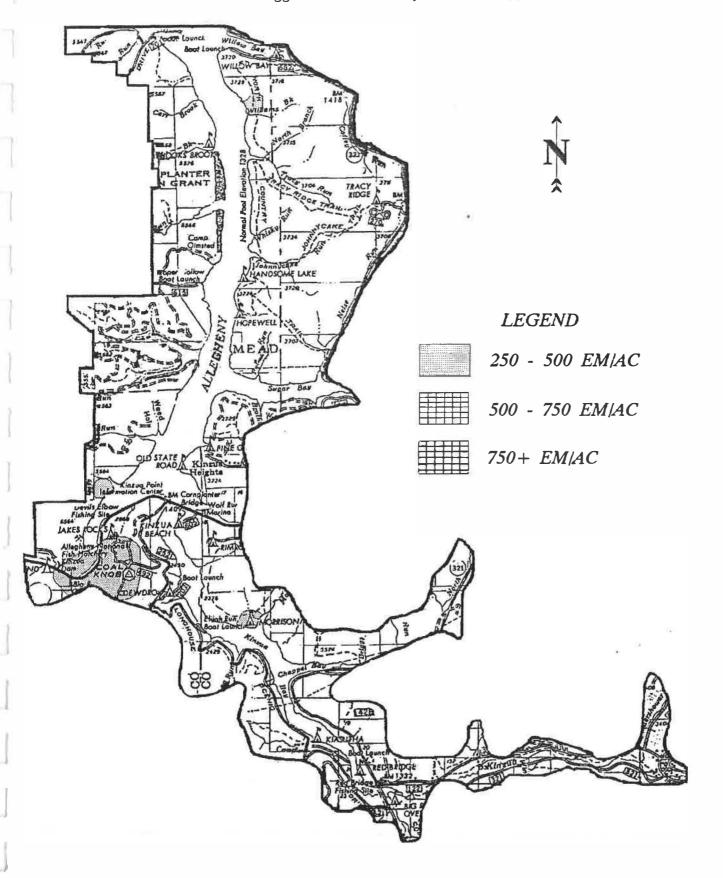
Table 3.--1991 Gypsy moth outbreak predictions, Allegheny National Forest.

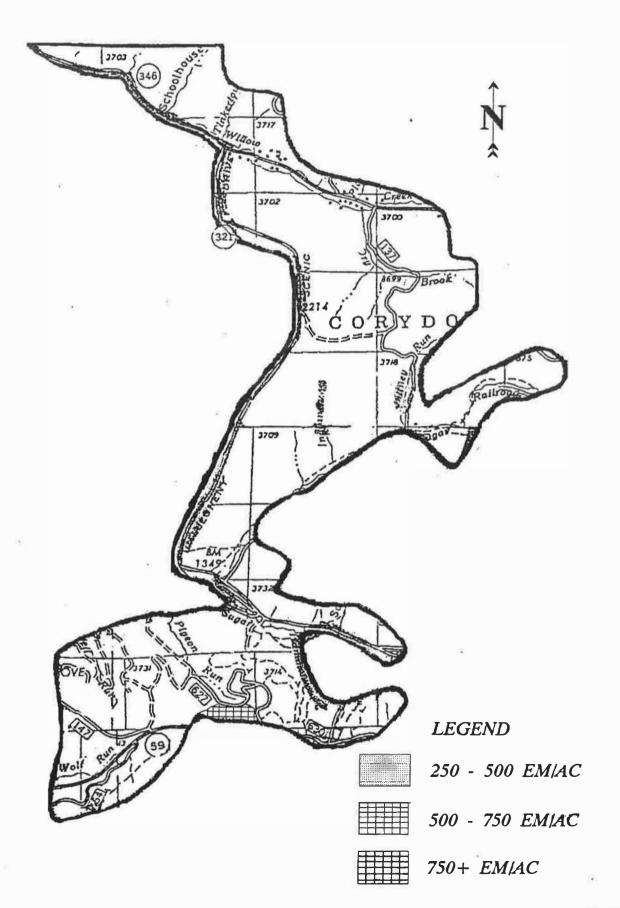
OA	Compartment Numbers	Net Acreage	Average	Range
B1M B2M	1-8 1,18,20-24,27,29,32,41-44,	6,840	Light	Very Light/Mod.
B7L	46,48 48-52	12,880 3,840	Very Light Very Light	Very Light/Light Very Light
B3M B8H	9-17,41,46-48,50-58,76,78, 79,86,87,90,92,100 25-28,30,31,40,44,45,	28,240	Light	Very Light/Light
-	51-55	13,760	Very Light	Very Light
M1L M10M	1-6,11,15,16,18 49,61,74,80-83,70,72,73,	7,323	Light	Light
M11M	62,64 50-59,62-64,67,69,70-72,77,	13,280	Very Light	Very Light
MION	78,92-96,105,106	2,223	Very Light	Very Light
M12M M5M	55,62,65,66,104,106 20,22,25-28	3,760 4,960	Very Light Very Light	Very Light/Light Very Light
M4H	22-24,27-31,33-35,38	6,800	Light	Very Light/Light
M7H	29,30,33-45,47-53,75,76	28,280	Light	Very Light/Light
M3L	2,7-10,12-14,16-19	6,360	Light	Very Light/Light
R11M	88,90-95,3	7,245	Very Light	Very Light
R12L	85,86,96,97,100,101,108	8,714	Very Light	Very Light
R8H	65,66,70,71,83-84,97,99	10,855	Very Light	Very Light
M12M*	105,107,109-114	9,717	Light	Light/Moderate
S8L	90-95,118,119,155	6,840	Very Light	Very Light
S12L	9-12	2,040	Very Light	Very Light
S4H	4-9,18-24,28,29	11,400	Light	Very Light/Light
S3H	10-16,32-35,37-39,63,64	40.400	Manuffala	Man, Link
S16M	86-94 1-4,6,25,27,49-51,81-84,	18,120	Very Light	Very Light
O TOW	128-138,144,146-148	13,680	Light	Very Light/Light
S14M	3,28,48,53-55,76-78	6,320	Light	Very Light/Light
S15H	89,120-122,135,136,138-141,	0,020	Ligit	
	145,150-154	11,840	Light	Very Light/Light

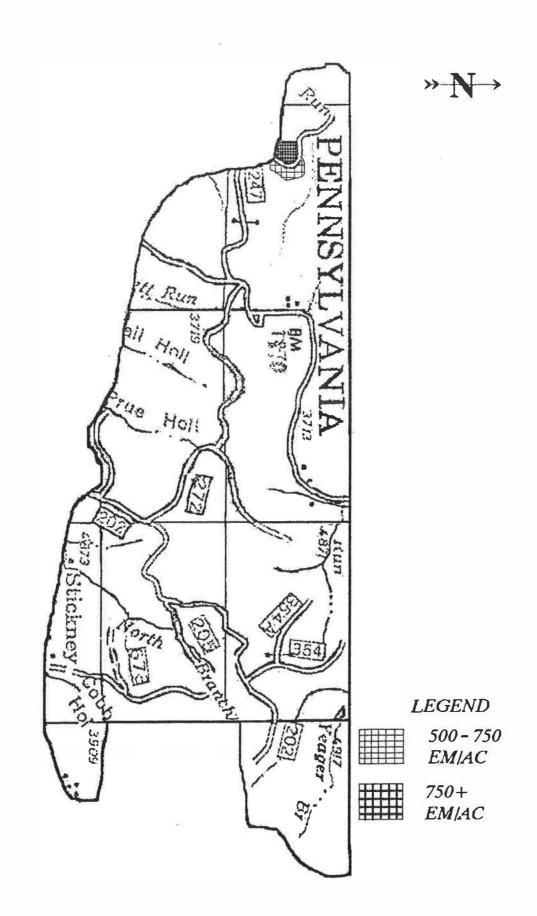
<sup>\*</sup>Ridgway Ranger District

**APPENDIX B** 

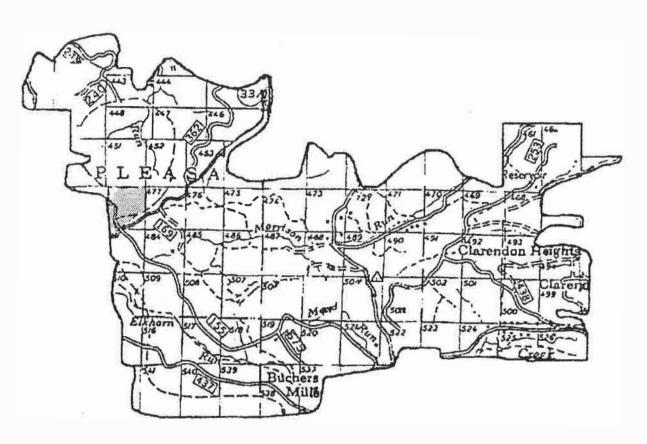












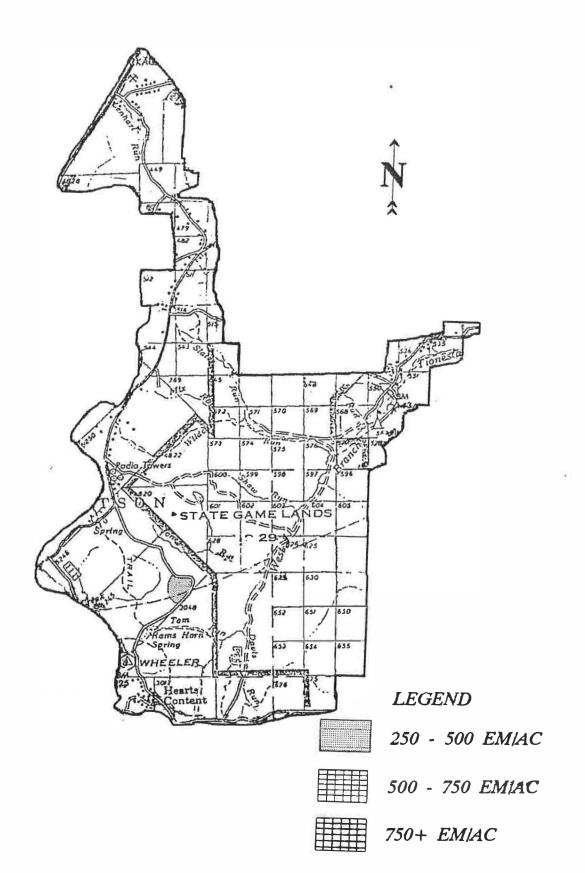


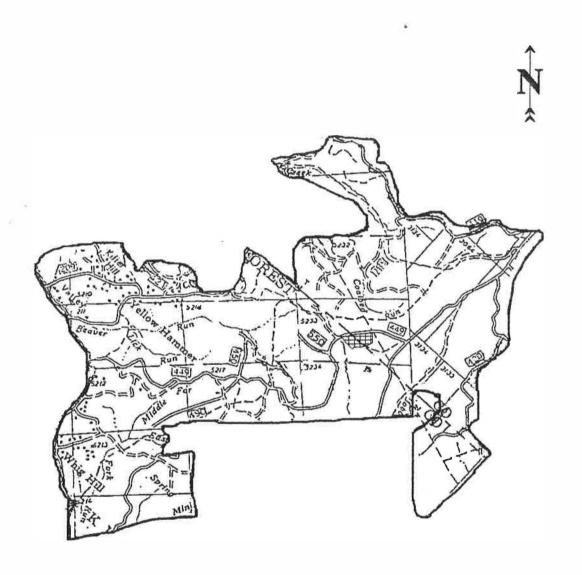
250 - 500 EM/AC



500 - 750 EM/AC







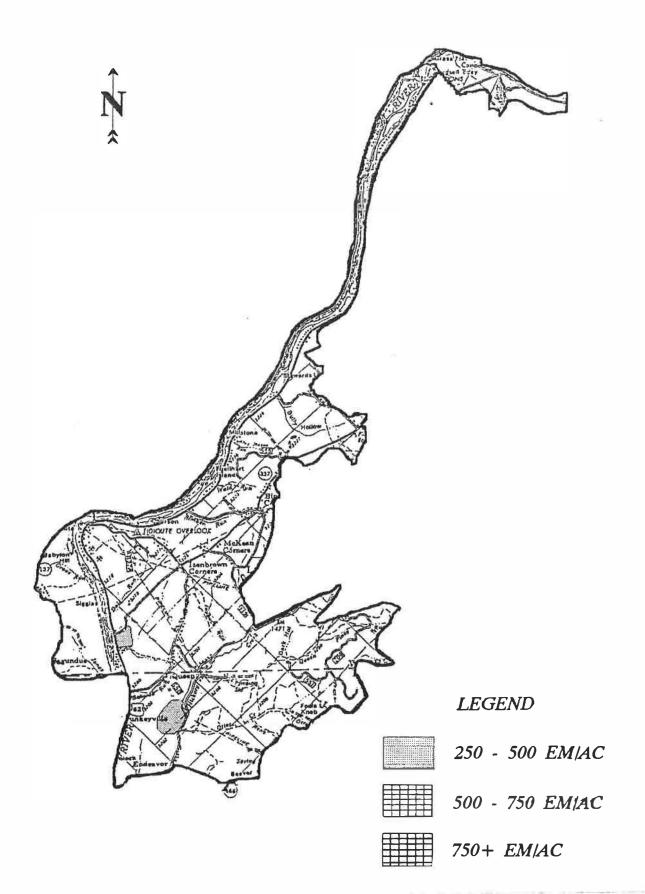


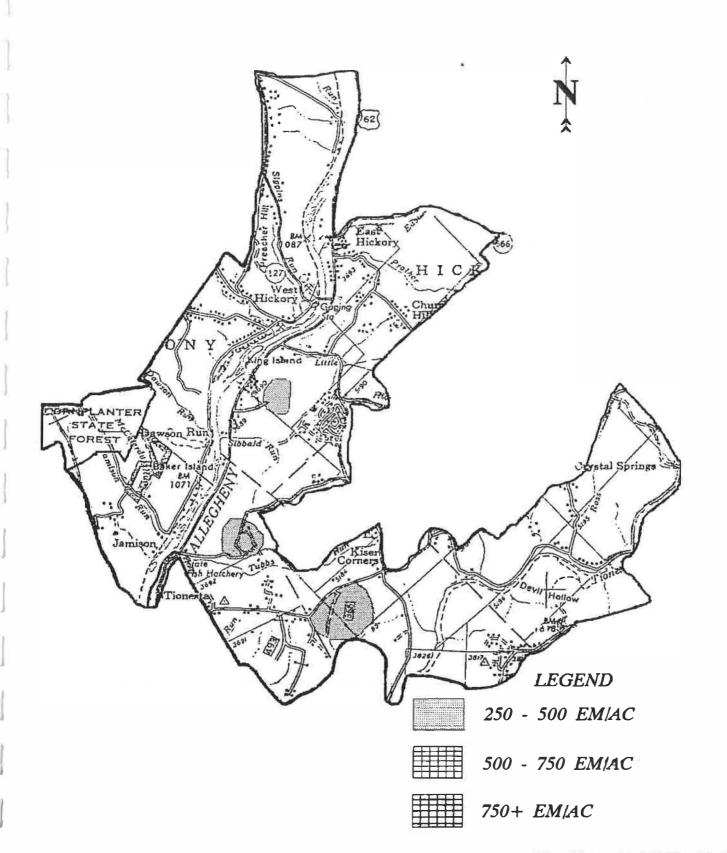
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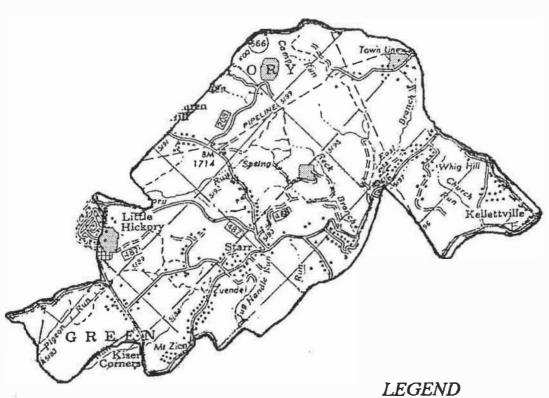
500 - 750 EM/AC











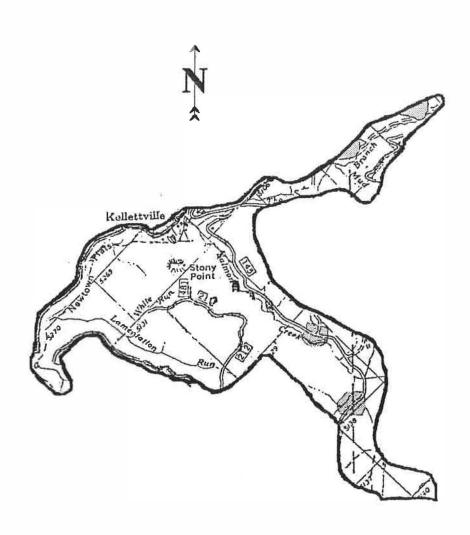


250 - 500 EM/AC



500 - 750 EM/AC







250 - 500 EM/AC



500 - 750 EM/AC







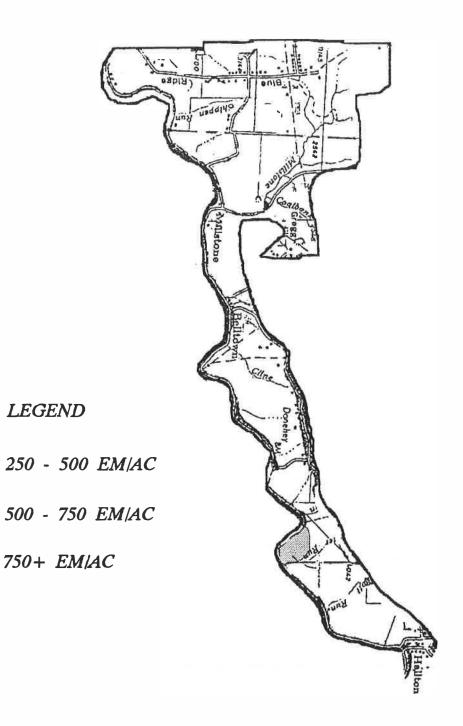


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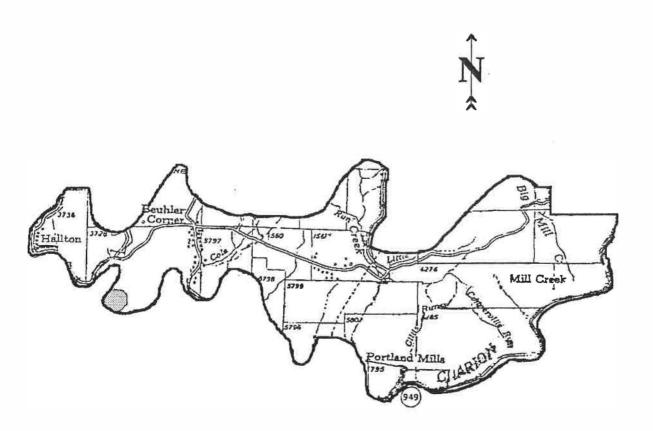


500 - 750 EM/AC











250 - 500 EM/AC



500 - 750 EM/AC

